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Dora Elena Jiménez
Adrián Saldarriaga-Isaza

Agricultural Policy and Covid-19 in Colombia

Dora Elena Jiménez,¹ Adrián Saldarriaga-Isaza²

Universidad Nacional de Colombia – Sede Medellín, Colombia

Abstract

This article measures the impact of economic policies focused on the agricultural sector decreed by the Colombian government within the framework of the State of Economic, Social, and Ecological Emergency in order to mitigate the negative effects of the pandemic on this sector. The agricultural sector plays an important role in the economy, not only because of its high demand for labor but also in terms of food security. In general, we find that this set of policies increases the agricultural production units receiving the incentives, which also increases rural households' disposable income and consumption to pre-covid levels.

JEL: Q18, C68, D58, R12

Keywords: Covid-19; agricultural policy; CGE modeling; distributional effects.

1. Introduction

The COVID-19 pandemic is one of the most serious challenges humanity is facing, not only due to its effects on health, but also due to the economic and social breakdown that comes with it. This pandemic caused an economic shutdown in many countries. It has affected, in particular, the agriculture and food sectors, and restaurant and school closures led to a rise in unemployment and reductions in the demand of certain commodities (Laure, 2020). Nevertheless, global food consumption has largely been unaffected due to the demand inelasticity of most agricultural products and the short duration of the strongest part of the shock (Elleby et al., 2020), despite income losses and local supply chain disruptions associated with the pandemic (Arellana et al., 2020).

¹ djimen0@unal.edu.co

² casaldarriagai@unal.edu.co

For Latin America, production and investment shrank 7% and 20% in 2020, respectively (CEPAL, 2021), and the unemployment rate is expected to increase to 13.5% (Bárcena & Cimoli, 2020). This would lead to an increase of 28 million people living in poverty (CEPAL, 2020), thus reversing global poverty reduction efforts (The Economist, 2020). However, this contrasts with the stable or increasing demand for labor in certain essential emergency response sectors such as health, agriculture, the food supply chain, pharmaceuticals, and energy supply (CEPAL-OIT, 2020).

At the local level, economic activity in Colombia dropped 6.8% in 2020. Monetary poverty grew 6.8 percentage points to 42.5%, and income inequality increased as well. Nevertheless, rural poverty decreased 4.6 percentage points to 42.9%. Provided the lockdown restrictions, Bonet et al (2020) estimate that the economic losses would have ranged between COP\$ 4.6 trillion and COP\$ 59 trillion per month, with differentiated regional impacts, some regions being more vulnerable than others.

At the sectoral level, although the short-term decline in sectors such as services and mining was evident, the initial expectation for the agricultural sector was less clear. ANIF (2020) had projected a growth of 2.5% in this sector due to the household prioritization of these goods during the crisis, while Botero & Montañez (2020) foresaw a decrease of 5% during 2020. In the end, the agricultural sector in Colombia grew 2.8% during 2020. However, several farmers, particularly small farmers, were severely hit by the lockdown. The closure of commercial establishments, hotels, and educational institutions, and the drop in household income caused a decrease in the domestic demand for some agricultural products. For example, according to FEDEPAPA,³ the closure of hotels and restaurants caused a 30% drop in the demand for potatoes. Therefore, there was a decrease in prices and production of some agricultural products as a consequence of excess supply in local markets.

The medium and long-term effects of the COVID-19 pandemic are still not clear, and much less is known about the post-pandemic economic and social recovery options. Among the recovery options, some authors see agriculture as a promising sector, bearing in mind not only its demand for labor, but also because of food security (IDN, 2020; LOOP, 2020; Okonji, 2020). To tackle the economic effects of the pandemic in countries' food production and distribution chain, governments worldwide have implemented different policies to deal with the effects of the pandemic. These policies include more cooperation between customs and border control authorities, suspension of tariff payments and other protectionist policies, support for small farmers in financial, technical, and sanitary issues, as well as logistical challenges such as the use of non-invasive monitoring mechanisms to speed up the clearance of goods (Aday and Aday, 2020; Bochtis et al., 2020; Giordano & Ortiz, 2020; Escobar et al., 2020).

In Colombia, within the framework of the declaration of the State of Economic, Social and Ecological Emergency, the national government arranged several incentives to

³ Colombian Federation of Potato Producers.

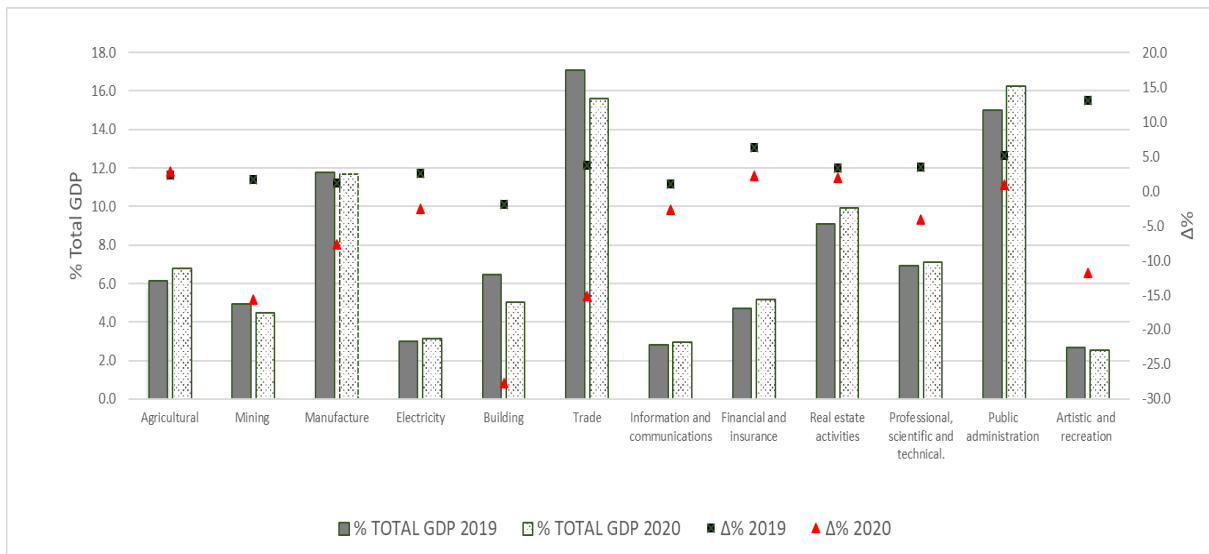
support households and provide incentives to employers to prevent layoffs and encourage production. In general, almost half of the 112 measures introduced by the Colombian government to deal with this pandemic were economic policies (Marriner & Becerra, 2020). For instance, unconditional cash transfer for emergency assistance to poor households had a positive effect on their well-being (Londoño-Vélez & Querubín, 2021). Some of these incentives were aimed at the agricultural sector. In regards to the set of policies targeted to this sector, Marrine & Becerra (2020) highlight that facilitating access to credit ended up benefiting almost entirely large companies; 94% of the loans were granted to large agricultural firms.

In this paper, we aim to examine how COVID-19 is affecting production and employment in Colombia's main crops (corn, cassava, potatoes, and rice) and livestock, and to evaluate the impact of the government's economic policies focused on the agricultural sector. This will allow us to identify the agricultural crops that could be most affected and how government policies can mitigate the negative impact of the pandemic on the sector. Specifically, we are interested in measuring the impact of economic policies aimed at the agricultural sector's recovery, among which are economic incentives for agricultural sector workers and aid for social benefit payments, a program to support the transport of perishable agricultural and livestock products, and a zero tariff for corn imports.

2. Background

To control the pandemic, restaurants, hotels, educational institutions, and commerce in general have been closed. More than a year after the first strict confinement was decreed, several restrictions remain. As a consequence, the total GDP fell by 6.8% in 2020. The most effected economic sectors were building, mining and quarrying, trade, and artistic, entertainment, and recreational activities, with decreases in production of 27.7%, 15.7%, 15.1% and 11.7%, respectively. In contrast, the financial sector grew by 2.1%, and the agricultural sector grew by 2.8% (See Figure 1).

Figure 1. Colombian GDP by sector, 2019-2020



Source: DANE (2016), authors' calculations.

Financial entities had profits COP \$14.23 trillion in 2020 (Financial Superintendence of Colombia, 2020). The financial sector's huge profits during the pandemic can be explained thanks to some of the benefits obtained by companies in 2020. Despite an income tax surcharge on the financial sector of 4% in 2020 and 3% for 2021 and 2022, they also benefited with an income tax reduction that went from 33% in 2019 to 30% in 2022 (Congress of the Colombia, 2019). Likewise, the Central Bank of Colombia reduced banks' reserve requirements by COP \$9.4 billion and, in addition, the government requested those financial entities invest that money in Internal Public Debt Securities, which would give them a profit of COP \$500 billion (Semana, 2020).

On the other hand, in the agricultural sector in 2020, fishing and aquaculture, crops, cattle, and forestry presented positive growth rates of 22.1%, 4.8%, 1.7% and 1.6%, respectively, while coffee production fell by 10.5%. Regarding other representative crops in Colombia, there was a decrease in the production of corn by 7.8% (Fenalce, 2021), and potatoes by 5.1% (Fedepapa, 2021). Finally, rice (Fedearroz, 2021) and cassava (Ministerio de Agricultura, 2021) production grew 14.7% and 1.5%, respectively.

On the other hand, as a result of the pandemic, there has been a significant decrease in the demand internal of agricultural commodities. For example, the hotel and restaurant sector, one of the main consumers of agricultural commodities, decreased its output by 36.8%. Additionally, although the demand for food is inelastic, the loss of household

income has also caused a significant reduction in their demand for food. It is estimated that between March and October 2020, household income fell by COP \$27.9 billion (ANDI, 2020). Consequently, by March 2021, only 68.8% of households consumed three meals per day, compared to 90.4% of households in the same month in 2020 (DANE, 2021).

Consequently, there was an excess supply of some crops such as cassava, rice, corn, and potatoes, which are consumed domestically, causing a drop in the price of these crops. In the case of coffee, despite a drop in its production, exports grew by 5.5%, and coffee growers obtained significant returns as a result of the rise in the price of coffee on the world market and the devaluation of the Colombian peso. Overall, 352,000 jobs were lost in rural areas (DANE, 2020); therefore, a drastic decrease in rural household income and an increase in poverty could be expected. However, in rural areas, the percentage of people living in monetary poverty decreased, moving from 47.5% in 2019 to 42.9% in 2020 (DANE, 2021).⁴ According to DANE, this is attributed to the mitigation effects of social programs and monetary aid implemented as a result of the pandemic, which was greater in rural areas (El Tiempo, 2021a).

The policies designed to mitigate the negative impacts of the pandemic in the rural sector in Colombia are as follows:

- *Subsidy for peasant labor* (Decree 486 of 2020). In total, about COP \$40 billion are being delivered to peasants over 70 that are not covered by any other government benefits; around 500,000 peasants received this subsidy.
- *Subsidy for farmers for service premium payments* (Decree 803 of 2020). The government would pay 50% of the service premium to formal peasant workers who earn a minimum wage. The subsidy benefits around 4.2 million peasant laborers, with an investment close to COP \$924 billion.
- *Subsidy to cover the interest rate and financial costs and expenses associated with agricultural credit operations* (Decree 486 of 2020). Especially, they considered (i) the commissions of the Agricultural Guarantee Fund estimated at a value of COP \$24.326 billion, and; (ii) the percentage of financial commissions for access to the Space Line of Credit, estimated at COP \$285 million.
- *Subsidy to small farmers for the transport of perishable agricultural and livestock products* (Decree 131 of 2020). The program has a budget of COP \$33.5 billion;

⁴ However, according to Fedesarrollo, this decrease in rural monetary poverty is also due to a change in the definition of rural poverty. DANE reduced the poverty line defining rural poverty by 5.3%, going from COP \$ 210,969 in 2019 to COP \$ 199,828 in 2020. (El Tiempo, 2021b).

its objective is to support 50% of the average cost of transportation of products such as potatoes, cassava, livestock, and fish produced by small farmers.

- *Economic Reactivation Plan for the Agricultural Sector* (Decree 168 of 2020). With a budget of COP \$32.6 billion, the program is focused on small agricultural producers and includes the purchase or rental of machinery and equipment to facilitate harvesting, post-harvesting, and storage of agricultural products. It also includes help for repairs and basic related adjustments to small productive infrastructure.
- *Subsidy for small potato farmers* (Decree 263 of 2020). The program has a budget of COP \$30 billion to support the commercialization of potatoes produced by small farmers.
- *Productive Alliances for Life*. This program seeks to connect small rural producers with a formal commercial ally who undertakes to buy part or all of the production and to participate in the entire process. The budget for this program is COP \$41 billion.
- *Tariff elimination for the import of some agricultural raw materials* (Decree 523 of 2020). Zero tariff for imports of raw materials such as corn, sorghum, soybeans, and soybean cake.

3. Methodology

A social accounting matrix (SAM) was built for the year 2014 with information from the Integrated Economic Accounts (IEA) and the Supply and Use Tables (SUT) (DANE, 2014a, 2014b). Together, the IEA and the SUT provided information on production, added value, intermediate consumption, income, exports, imports, taxes, and government consumption. In the second stage, by using data from the 2014 national agricultural census (DANE, 2016), the SAM was expanded to focus on the rural sector. The SAM with agricultural sector disaggregation allowed us to focus on the effects of the policy on four crops—corn, cassava, rice, and potatoes—and cattle, based on the share of each crop in total crop output.

Additionally, a national household survey was used to single out two representative households, one rural and one urban. To split agricultural activities into small, medium, and large production units, we used information from the Colombian institutes INCORA (1996) and IGAC (2012). Hence, the information on agricultural activities was classified according to the size of the agricultural production units as large, medium, and small. Provided that cost structures differ across the different production technologies (small,

medium, large), we used the RAS method (Trinh and Viet, 2013) to balance the SAM, imposing two constraints: (a) known totals from the supply and use tables (i.e., total intermediate input and factor demand by aggregated activities), and (b) the value of output by firm size.

Finally, we used information from the national household survey and income and the expenditure survey to divide the labor factor in the SAM into skilled and unskilled labor, and each of these divisions into either rural or urban households. According to the demographic census of 2018, 23% of households are rural and 77% live in urban areas. The gross exploitation surplus of the original SAM was divided into capital, land, and natural resources used in livestock, fishing, and forestry by using information derived from the GTAP database. For the division of the gross operating surplus into skilled and unskilled labor, capital, and land, we also turn to the Colombian SAM built by GTAP. In this database, there is no crop-level information; therefore, the same labor-capital ratio is present in all crops

With this SAM, we simulated the effects of the COVID-19 pandemic and the policies already described in section 2 by using a single-country static computable general equilibrium model. This CGE model is based on Decaluwé et al. (2013), with some extensions as described in Jiménez et al. (2021). The model includes the following three options for capital and land:

- a) Capital and land are fixed and specific for each sector (K-fix).
- b) Capital and land are mobile between sectors (K-mob).
- c) Land is mobile between sectors and capital has a horizontal supply curve (infinite supply) (K-sup).

The shocks introduced in the models are the following:

- Total factor productivity

We model the subsidy to cover the interest rate and financial costs and expenses associated with agricultural credit operations as an increase in total factor productivity (Echevarria et al 2018). According to our calculations, this policy would have an impact on the total factor productivity of 6%.

- Subsidy for labor

Subsidies for peasant labor and subsidies for farmers for service premium payments are considered as a labor subsidy. These subsidies create an increase in the demand for labor, especially unskilled labor. According to our calculations, subsidies for peasant labor generate a positive impact on the demand for labor of 0.1873%, and the subsidy for service premium payments has an impact of 2.618%.

- Subsidy for production

We model the subsidy for small farmers for the transport of perishable agricultural and livestock products, productive alliances for life, and the subsidy for small potato farmers as a reduction on the tax rate on production, since these policies reduce production costs and, therefore, should increase production. We estimate that the transport subsidy for small farmers leads to a reduction on the tax rate of 0.19%, productive alliances for life leads to a reduction of 0.61%, and the subsidy for small potato farmers leads to a reduction of 3.9%.

- Subsidy for capital

The economic reactivation program for the agricultural sector is modeled as a subsidy for capital, since this program includes the purchase of machinery and aid to improve the productive infrastructure in small and medium production units in the agricultural sector. According to our calculations, the policy would generate a reduction in the agricultural sector's capital tax rate of 1.0065%

- Tariff reduction

Zero tariff for corn imports.

The implementation of policies aimed at the agricultural sector creates an increase in public spending of 1%. The effects of the set of policies is measured by first considering a scenario where the negative shock of the pandemic in the agricultural sector (*Covid* scenario), according to the shocks already shown in section 2.

We analyze the effects of the set of policies, considering two sources for financing the policies: direct taxes on households (*tax-house*) and taxes on the financial sector (*tax-fin*). The objective of this analysis is to contrast the impacts on the economy of the different sources of financing in order to identify the source of financing with the least negative effects on economic performance and on the distribution of income between rural and urban households. Both types of taxes have been in the national policy discussion on progressive tax reforms. In particular, specific tax collection from the financial sector is politically feasible for the reasons already mentioned in section 2. Indirect taxes on commodities are not analyzed because they are considered regressive (Decoster et al., 2010).

4. Results

Table 1 shows the effects of different sources of financing on some macroeconomic indicators for three capital options. When the capital is fixed (*K-fix*), *tax-house* and *tax-fin* have a positive impact on rural and urban consumption. Likewise, there is a positive impact on household disposable income, especially for rural households. Finally, there

is also a growth in the GDP. On the other hand, for the other two options considered (*K-mob* and *K-sup*), *tax-house* and *tax-fin* produce results that are very similar to those found in the fixed capital option; they are higher due to greater flexibility, especially in the *K-sup* scenario.

Table 1. Macroeconomic indicators for two different sources of financing public spending

	<i>Tax-house</i>			<i>Tax-fin</i>		
<i>Variable</i>	<i>K-fix*</i>	<i>K-mob*</i>	<i>K-sup*</i>	<i>K-fix*</i>	<i>K-mob*</i>	<i>K-sup*</i>
Urban-Household consumption	8.11	8.32	12.81	8.05	8.24	14.47
Rural-Household consumption	3.96	5.16	8.17	4.09	5.33	7.3
Urban disposable income	2.19	3.53	6.18	2.18	3.52	6.81
Rural disposable income	6.23	10.43	17.35	6.64	10.97	13.92
GDP at market prices	6.16	6.88	9.26	5.88	6.24	9.83

* % change w.r.t. Covid scenario

K-fix, *K-mob* and *K-sup* denote capital and land are fixed, capital and land are mobile, and land mobile and horizontal supply curve for capital, respectively.

Table 2. Change in the aggregate output of crops of some commodities for two different sources of financing public spending

Product	<i>Tax-house</i>			<i>Tax-fin</i>		
	<i>K-fix*</i>	<i>K-mob*</i>	<i>K-sup*</i>	<i>K-fix*</i>	<i>K-mob*</i>	<i>K-sup*</i>
Cassava- <i>small</i>	12.7	11.1	13.9	12.7	11.1	14.6
Potato - <i>small</i>	17.6	16.5	19.6	17.6	16.5	20.2
Corn	11.1	9.5	12.5	11.1	9.5	13.1
Rice	10.9	9.1	12.0	10.9	9.0	12.7

Other crops	11.4	9.8	12.7	11.4	9.8	13.3
Cattle	9.8	9.5	12.6	9.8	9.5	13.2
Hotels & Rest	33.2	30.7	35.2	33.2	30.7	36.4

* % change w.r.t. Covid scenario

K-fix, *K-mob* and *K-sup* denote fixed capital and land, mobile capital and land, and land mobile and horizontal supply curve for capital, respectively.

Crops such as cassava, corn, potatoes and rice, and cattle benefit from some subsidies aimed at small agricultural producers. In the *K-fix* scenario, *tax-house* and *tax-fin* make the output of all crops and cattle grow (see Table 2). The elimination of tariffs causes an increase in corn imports (see Table 3). Despite the elimination of tariffs on imports of this crop, the policy makes corn output grow too. However, the greater domestic supply of these commodities would cause a fall in their domestic price, since a significant percentage of their output is destined for the domestic market. One of the sectors that benefits the most from the drop in price are hotels and restaurants, as they are some of the main consumers of these commodities. Finally, the hotel and restaurant sector has grown significantly; this rebound may be due to the post-pandemic economic reactivation (see Table 2).

In the *K-mob* scenario, *tax-house* and *tax-fin* also positively impact output, but less than when capital is fixed. Although this option assumes that the land can be used in different crops, each crop requires special natural conditions. This intrinsic characteristic of the crops is considered in our SAM when we consider the regional distribution of the different crops. In the *K-sup*, due to the assumption of greater flexibility, there is a slightly higher growth than in the *K-fix* and *K-mob* scenarios in the output of crops and in the hotel and restaurant sector (see Table 2).

Table 3. Change in quantity of corn imported (%)

Change in quantity of corn imported (%)		
Scenario	Direct	Finance
<i>K-fix</i>	5.63	5.64
<i>K-mob</i>	8.28	8.31
<i>K-sup</i>	12.50	13.07

On the other hand, cassava, corn, potato, and rice crops have a high demand for unskilled labor. Therefore, the increase in production must be accompanied by an

increase in the demand for unskilled labor in both urban and rural areas. *K-fix*, *tax-house* and *tax-fin* causes an increase in the demand for unskilled labor for these crops in both rural and urban areas. The demand for skilled labor also increases in both rural and urban areas; however, this increase in demand is lower than that of unskilled labor (see table 4a and 4b). For cattle, there is also an increase in the demand for skilled and unskilled labor; but in this case, the increase in the demand for labor is less compared to crops because cattle raising is intensive on land.

Table 4a. Changes in urban and rural labor demand (%) financing through direct taxes on households

Product	<i>K-fix</i> *				<i>K-mob</i> *				<i>K-sup</i> *			
	Skilled labor		Unskilled labor		Skilled labor		Unskilled labor		Skilled labor		Unskilled labor	
	Urb	Rur	Urb	Rur	Urb	Rur	Urb	Rur	Urb	Rur	Urb	Rur
Cassava	8.6	8.5	9.3	7.0	8.2	8.4	8.0	5.1	11.3	11.7	11.0	7.6
Potato	14.5	14.5	15.3	12.8	13.7	14.0	13.5	10.5	17.0	17.4	16.6	13.1
Cattle	5.1	5.1	5.8	3.6	5.6	5.9	5.5	2.7	9.1	9.5	8.8	5.5
Other crops	7.1	7.1	7.8	5.6	7.0	7.3	6.8	4.0	10.2	10.6	9.9	6.5
Rice	8.7	8.6	9.4	7.1	7.8	8.1	7.7	4.8	11.0	11.3	10.6	7.3
Corn	6.8	6.7	7.5	5.2	6.7	7.0	6.6	3.7	9.9	10.3	9.6	6.3

* % change w.r.t. Covid scenario

K-fix, *K-mob* and *K-sup* denote fixed capital and land, mobile capital and land, and land mobile and horizontal supply curve for capital, respectively.

For both financing options in *K-mob*, the demand for unskilled and skilled labor increased in both urban and rural areas. In this case, the growth in the demand for labor is lower compared to the case when capital is fixed, which is a consequence of the lower increase in crops and cattle output. Finally, in the *K-sup* scenario, with respect to *K-fix* and *K-mob*, the demand for unskilled and skilled labor increased in both urban and rural areas as a consequence of the increase in output in this scenario.

Table 4b. Changes in urban and rural labor demand (%) financing through tax surcharge on the financial sector

Product	<i>K-fix</i> *				<i>K-mob</i> *				<i>K-sup</i> *			
	Skilled labor		Unskilled labor		Skilled labor		Unskilled labor		Skilled labor		Unskilled labor	
	Urb	Rur	Urb	Rur	Urb	Rur	Urb	Rur	Urb	Rur	Urb	Rur
Cassava	8.6	8.5	9.3	7.0	8.2	8.4	8.0	5.1	11.8	12.5	11.4	8.3
Potato	14.5	14.5	15.3	12.8	13.7	14.0	13.5	10.5	17.5	18.2	17.1	13.7
Cattle	5.1	5.1	5.8	3.6	5.6	5.9	5.5	2.6	9.7	10.4	9.3	6.2
Other crops	7.2	7.1	7.9	5.6	7.0	7.2	6.8	4.0	10.7	11.4	10.3	7.2
Coffee	14.2	14.1	14.9	12.5	83.6	84.0	83.4	78.4	73.3	74.4	72.7	67.8
Rice	8.7	8.6	9.4	7.1	7.8	8.1	7.7	4.8	11.5	12.2	11.1	8.0
Corn	6.8	6.7	7.5	5.2	6.7	7.0	6.6	3.7	10.4	11.1	10.0	6.9

* % change w.r.t. Covid scenario

K-fix, *K-mob* and *K-sup* denote fixed capital and land, mobile capital and land, and land mobile and horizontal supply curve for capital, respectively.

Finally, Figure 2 shows the impact of policies on the different sources of household income for the two financing options. When capital is fixed, both labor and capital income show positive but relatively small growth. For rural households, for both financing options, their total income grows by 0.07%, while urban ones grows only 0.01%. Nevertheless, total household income recovers to pre-covid levels.

On the other hand, when capital is mobile, the impact is a little higher, although also not very significant, with an increase of 0.11% in total rural household income and 0.2% for urban households. In other words, the policies have no impact on the income received by households. Overall, the growth in total income is higher for rural households for both financing options, although it is a little higher for *tax-fin* (see Figure 3).

Figure 2. Change (%) in household income financing through direct taxes on households (a), and through a tax surcharge on the financial sector (b).

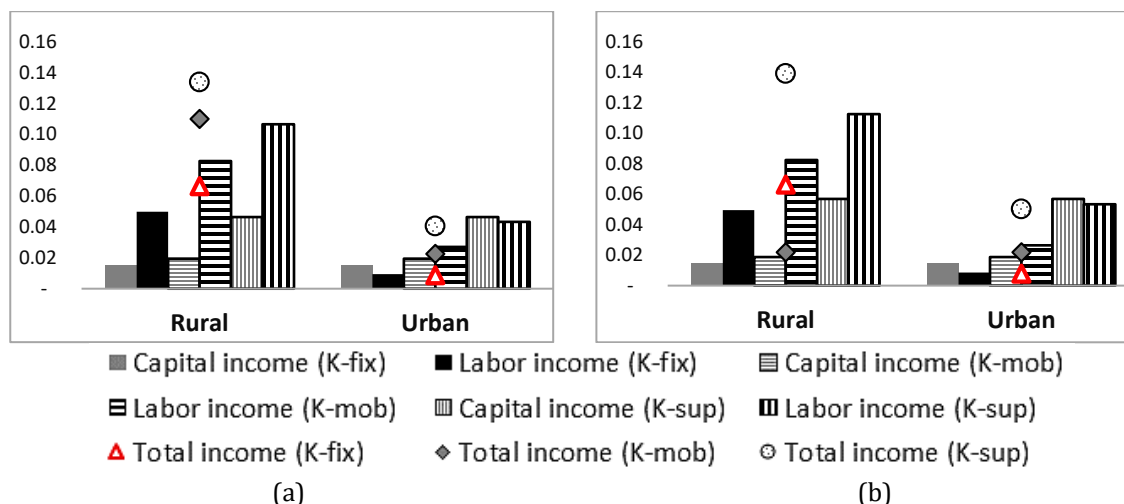
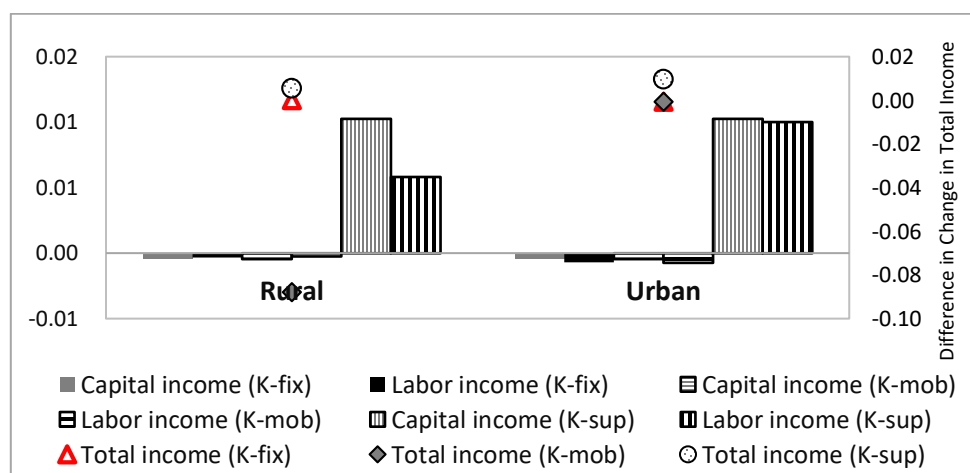


Figure 3. Differences in percent changes between *tax on the financial sector* and *taxes on households*.



5. Concluding Remarks

Policy impact is analyzed in three scenarios, where different land and capital mobilities are considered. In general, the results for the three scenarios are similar, finding that the greater the flexibility in the mobility of the factors, the greater the impact of the policies. The fall in the economic activity due to the COVID-19 pandemic mainly affected the hotel and restaurant, construction, and minerals and petroleum extraction sectors. Among the main agricultural products, there was also a decrease in the production of corn, potatoes, rice, coffee, and coffee products. Furthermore, the

decrease in the hotel and restaurant sector caused a severe drop in the demand for several commodities. For example, this sector's demand for potatoes fell by 30%, leading to an excess supply that caused potato prices to decline sharply, with huge economic losses for small farmers.

The set of policies analyzed in this paper lead to an increase in the production of main agricultural products, well above 10% after the shock of the COVID-19 pandemic. In general, total production would increase by 4.41% and GDP would increase by more than 5%. The labor demand also increases, especially in the rural sector, which benefits the most from these policies. In particular, with the implementation of these policies, the demand for unskilled labor in the rural sector increases. These differences in changes in labor demand cause an increase in households' disposable income, especially rural household income, which in turn increases consumption. Overall, rural household's disposable income and consumption are recovering to pre-covid levels.

Finally, the policy focused on small potato farmers can help restore the livelihood of peasants severely affected by the negative shock caused by the pandemic. On average, these small farmers may increase their production by 17% after the shock.

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